2217

Electronic Services - Los Angeles
M10388X

instruction manual

METROLOGY GROUP

INSTRUCTION MANUAL

MODEL 5920 SERIES
IN-LINE READOUT

Model 5925 - Remote Readout Counter

Beckman®

Berkeley Division

INSTRUCTION MANUAL

MODEL 5920 SERIES
IN-LINE READOUT

Serial_____

NOTE

If model number is followed by one or more letters, the instrument covered by this manual has been modified. See section on modifications.

Beckman/ Berkeley Division
Richmond 3, California

February 1960

WARRANTY

Instruments sold by Berkeley Division, Beckman Instruments, Inc., (hereafter called "the Company") are warranted only as stated below.

Subject to the exceptions and upon the conditions specified below, the Company agrees to correct, either by repair, or, at its election, by replacement, any defect of material or workmanship which develops within one year after delivery of the instrument to the original purchaser by the Company or by an authorized representative, provided that investigation and factory inspection by the Company discloses that such defect developed under normal and proper use.

The exceptions and conditions mentioned above are the following:

(a) Some components and accessories by their nature are not intended to, and will not, function one year. If any such component or accessory manufactured by the Company and part of the item sold fails to give reasonable service for a reasonable period of time, the Company will, at its election, replace or repair such component or accessory. What constitutes reasonable service and what constitutes a reasonable period of time shall be determined solely by the Company after the Company is in posession of all the facts concerning operating conditions and other pertinent factors and after such component or accessory has been returned to the Company, transportation prepaid.

(b) All instruments claimed defective must be returned to the Company, transportation charges prepaid, and will be returned to the customer with the transportation charges collect, unless the item is found to be defective in which case the Company will pay all transportation charges.

(c) The Company makes no warranty concerning components or accessories not manufactured by it, such as tubes, fuses, batteries, etc. However, in the event of the failure of any component or accessory not manufactured by the Company, the Company will give reasonable assistance to the purchaser in obtaining from the respective manufacturer whatever adjustment is reasonable in the light of the manufacturer's own warranty.

(d) Except as stated above, the Company makes no warranty, express or implied (either in fact or by operation of law), statutory or otherwise; and, except to the extent stated above, the Company shall have no liability under any warranty, express or implied (either in fact or by operation of law), statutory or otherwise.

(e) The Company expressly disclaims any liability to its customers, dealers, and to users of its products, and to any other person or persons for consequential damages of any kind and from any cause whatsoever arising out of or in any way connected with the manufacture, sale, repair, replacement of, or arising out of or in any way connected with the use of any of its products.

(f) Representations and warranties made by any person, including representatives of the Company, which are inconsistent or in conflict with the terms of this warranty (including but not limited to the limitation of the liability of the Company as set forth above) shall not be binding upon the Company unless reduced to writing and approved by an officer of the Company.

(g) This warranty shall be governed by the laws of the State of California.

Claims for damage in shipment should be filed promptly with the transportation company.

All correspondence concerning the instrument should specify the model and serial number. This information appears on the company name plate. Any inquiry concerning details of operation, possible modifications, etc., should be addressed to the Sales Department, Berkeley division of Beckman Instruments, Inc., Richmond 4, California.

REPAIR SERVICE

Experienced service personnel and special test equipment are available at the factory to perform any necessary repairs. Every effort will be made to expedite the repair of instruments returned for servicing. Repair work will be performed only upon receipt of a written purchase order or authorization. Instruments to be repaired should be addressed to SERVICE AND REPAIR DEPARTMENT with transportation charges prepaid. Repaired instruments will be returned to the purchaser with transportation charges collect.

Berkeley reserves the right to make changes in design at any time without incurring any obligation to modify equipment previously purchased to conform to subsequent design changes.

BERKELEY DIVISION
BECKMAN INSTRUMENTS, INC.

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MODIFICATIONS

DIAGRAMS

Model 5924 Master Schematic Diagram, Dwg. No. 5924 D 1
Model 5925 Master Schematic Diagram, Dwg. No. 5925 D 1
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Model 5927 Master Schematic Diagram, Dwg. No. 5927 D 1
Converter Unit (1-2-2-4) Schematic Diagram, Dwg. No. 5920 D 1
Converter Unit (1-2-4-8) Schematic Diagram, Dwg. No. 5920 D 200
Control Unit Schematic Diagram, Dwg. No. 5920 C 3
Indicator Unit Schematic Diagram, Dwg. No. 5920 C 2
Power Supply Schematic Diagram, Dwg. No. 5920 E 4

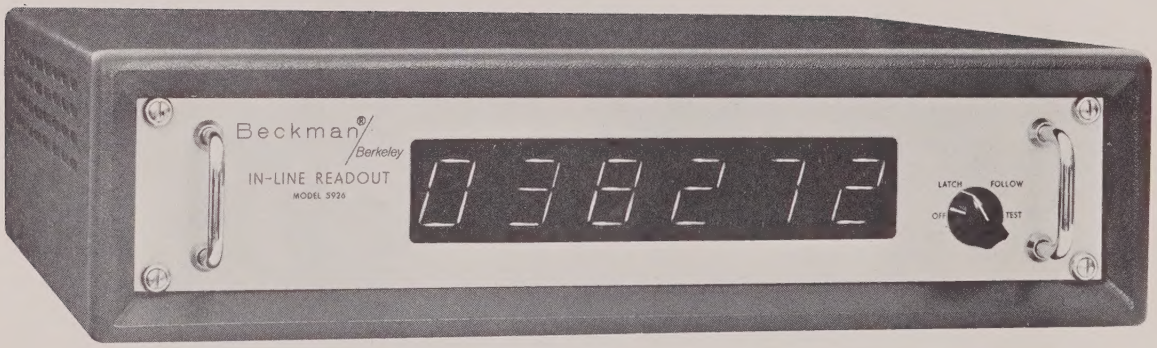


Fig. 1. The 5926 provides a six digit, in-line display of electronic counter readings. Other models in this series are the same except for the number of digits displayed.

5926R

1. INTRODUCTION

DU-78224

1.1 GENERAL DESCRIPTION

The 5920 series In-line Readout is an auxiliary unit which displays the readings of an electronic counter in large decimal digits arranged on a single horizontal line. The Readout receives its information from the counter in the form of binary-coded output signals. It then converts these signals into an illuminated display consisting of bright-red digits 1 - 1/4 inches high, appearing against a dark background and lying in the same vertical plane. Displayed numbers are therefore easy to read both under intense ambient light, and over a wide viewing angle.

The 5920 Readout has three operating modes: Latch, Follow, and Test. In the Latch mode, the unit displays only the count registered at the end of each counting period. In the Follow mode, on the other hand, the unit continually samples the counter output at a fixed rapid rate and displays the count registered at each sampling. The Test mode provides a means of determining whether all indicators are functioning correctly.

The 5920 series includes four basic models which differ only in the maximum number of digits displayed. The last digit in the model number indicates how many digits the unit can display. Although this unit is designed to operate with Beckman/ Berkeley counters, it can be used with any instrument which generates a four-place binary readout code for each decimal digit.

The 5920 series Readout is made up entirely of solid state components and can be operated inside its cabinet or mounted in a standard 19 inch relay rack.

1.2 TECHNICAL CHARACTERISTICS

Type of Display

In-line, in-plane, with illuminated bright red numerals 1 - 1/4 inches high against dark background.

Display Capacity

Model 5924:	4 digits
Model 5925:	5 digits
Model 5926:	6 digits
Model 5927:	7 digits

Input Required

Each decimal digit requires a 1-2-2-4 binary code represented by four input voltage levels at ground potential or -13 volts minimum.

Operating Modes

Latch, Follow, and Test

Display Repetition Rate -13

15 per second maximum -14

Ambient Temperature Limits

0 to 55 deg. C.

Power Required

45 watts at 117 v. AC (±10%), 50 to 60 cps

Dimensions

With cabinet: 20 - 3/4 inches wide, 5 - 1/2 inches high, 17 inches deep
Without cabinet: 19 inches wide, 3 - 1/2 inches high, 17 inches deep

2. OPERATION

2.1 PREPARING FOR OPERATION

The Readout unit is ready for use as soon as it is unpacked from its shipping container and inspected for damage in transit. The unit can be operated inside its cabinet or mounted in a standard 19 inch relay rack.

Ordinarily, the Readout should have the same digit display capacity as the counter with which it is used. If the counter used displays fewer digits than the Readout unit, the Readout indicators in the unused digit positions will display unintelligible information. Each unused indicator, in such a case, can be disabled by disconnecting the B- line supplying its lamps.

CAUTION

In disabling the indicator lamps, care should be taken not to disconnect the gate control circuit from the B- supply line.

To put the unit into operation, proceed as follows:

1) Connect the power cord to a 117 volt, 50-60 cps source.

2) Plug the 40-pin cable connector from the Readout into the DIGITAL RECORDER socket at the rear of the counter. (Note: If the Readout is being used with an instrument other than a Beckman/Berkeley counter, see the schematic diagram for the correct input connections.)

3) Turn the selector switch on the front panel of the Readout to TEST. If the unit displays the figure "8" in each digit position, all indicators are functioning properly, and the Readout can be put into operation by turning the selector switch to LATCH or FOLLOW, depending on the operating mode wanted.

2.2 DESCRIPTION OF THE OPERATING MODES

2.2.1 The FOLLOW Function

In this mode of operation, the Readout unit continually samples the coded output signals from the counter at a fixed rate of about 15 per second, and

displays the count registered at the time of each sampling. Thus, while the counter is scaling, the Readout unit tends to follow the changing count, with the display changing at a maximum rate of 15 times a second.

2.2.2 The LATCH Function

In this mode, the Readout unit samples the coded output from the counter only when the counter sends out a control signal; this happens at the end of each counting period. Consequently, the Readout unit displays only the count registered at the end of a counting period and maintains this display until the end of the next counting period. If the registered count at that time is the same as that of the previous period, there will be no visible interruption of the display on the Readout unit. Thus, if it is necessary to record manually the registered count at the end of each counting period, the FOLLOW mode may be the more convenient one to use.

2.2.3 The TEST Function

In this mode, the unit generates a set of internal signals which illuminates all display elements in each digit indicator. If all the indicators are working properly, the unit displays the figure "8" in every digit position. Conversely, any digit indicator which does not display an "8" is faulty.

3. SERVICING

3.1 REPLACING INDICATOR LAMPS

The 5920 series Readout uses aircraft type indicator lamps designed to have a long operating life and to withstand vibration and shock. If it does become necessary to replace a lamp in one of the indicator assemblies, proceed as follows:

1) Remove the two screws (one on top, one on bottom) which hold the indicator assembly to the chassis and lift the indicator clear of the front panel. Be careful not to yank the connecting leads.

2) Unfasten the lamp block from the front of the indicator assembly, taking care to keep the back of the block pointed upward.

3) Slip the burned out lamp out of the back of the lamp block and replace with a new one.

4) Fasten the lamp block to the front of the indicator assembly, making sure the block is rightside up (the round hole in the front of the block should be in the lower right-hand corner).

5) Carefully push the indicator assembly back into place and fasten to the chassis.

MODIFICATIONS

MODIFICATION H

With this modification, the unit is supplied with the power transformer (T401) wired to operate from a 220 volt, 50-60 cps AC source (see power supply schematic). Note that the line fuses (F401, F402) are rated at 1/2 a. for 220 volt operation.

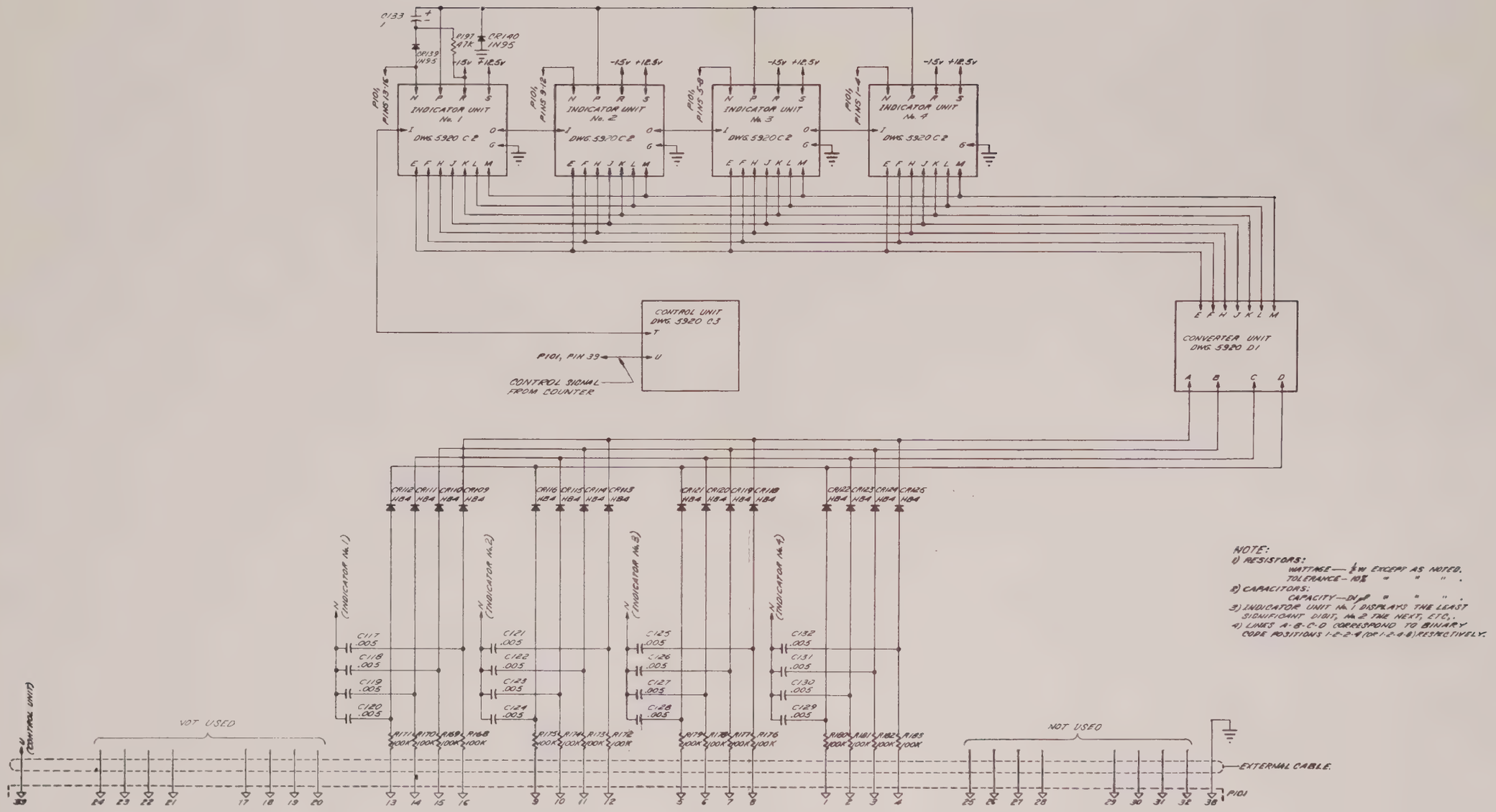
MODIFICATION R

In this modification, the instrument is supplied with a chassis cover instead of a cabinet. The unit can thus be mounted in a standard 19 inch rack.

MODIFICATION T

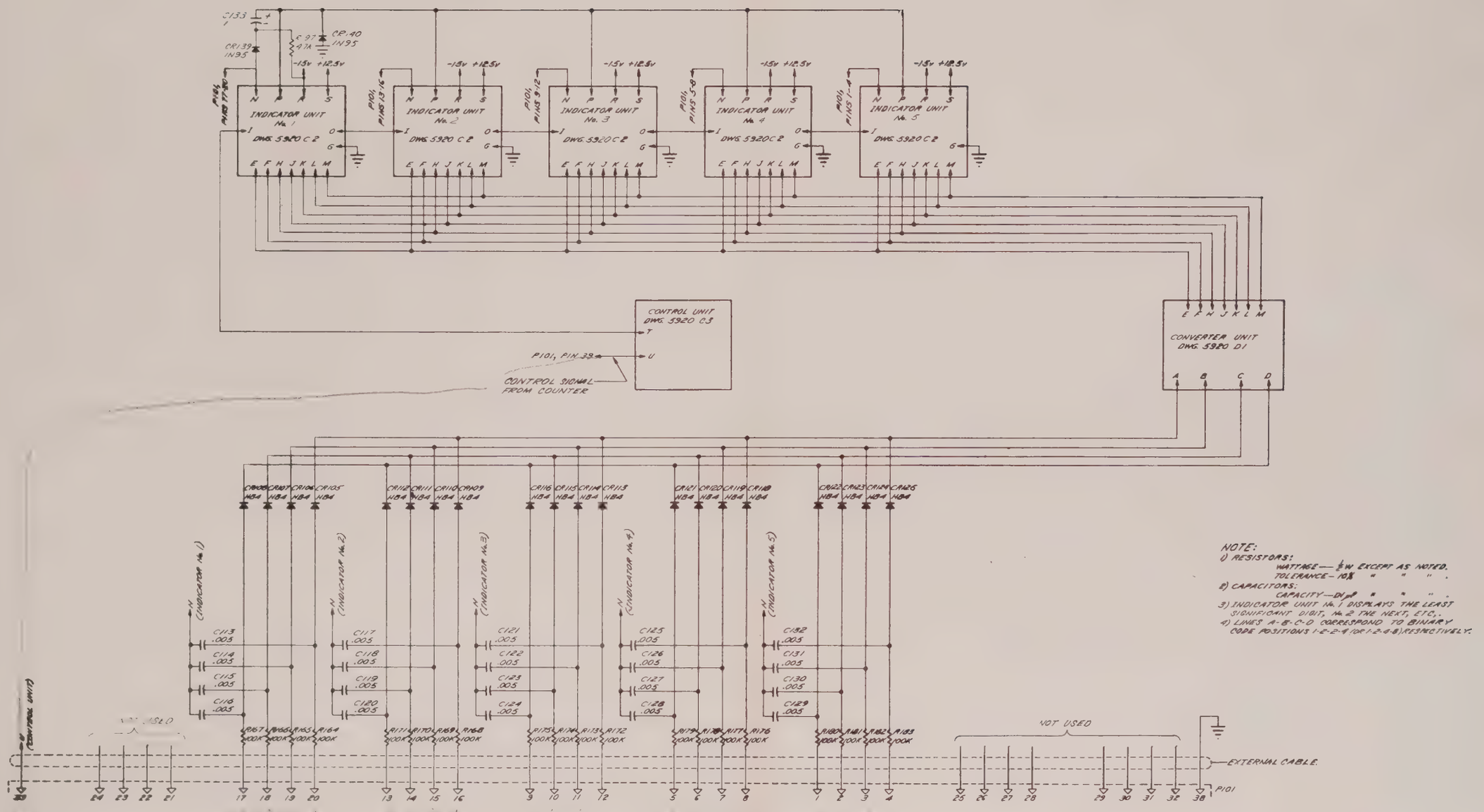
In this modification, the converter unit has been changed so that the instrument will operate with a 1-2-4-8 binary code input. See drawing 5920 D 200.

MODEL 5924, MASTER
SCHEMATIC DIAGRAM



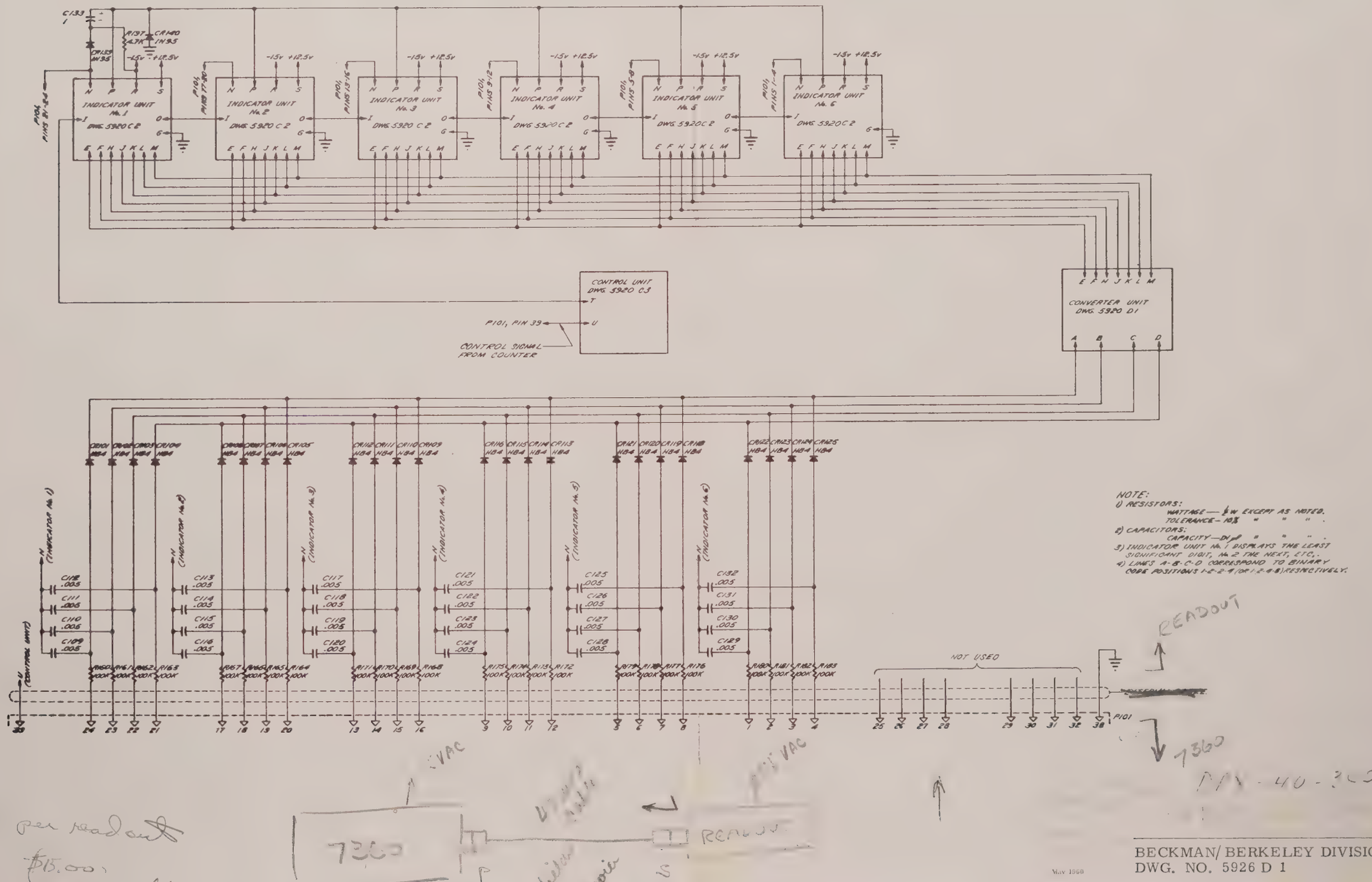
NOTE:
1) RESISTORS:
WATTAGE — ½W EXCEPT AS NOTED.
TOLERANCE — 10% " " " .
2) CAPACITORS:
CAPACITY — IN μf " " " .
3) INDICATOR UNIT No. 1 DISPLAYS THE LEAST SIGNIFICANT DIGIT, No. 2 THE NEXT, ETC.,
4) LINES A-B-C-D CORRESPOND TO BINARY CODE POSITIONS 1-2-2-4 (OR 1-2-4-8) RESPECTIVELY.

MODEL 5925, MASTER SCHEMATIC DIAGRAM



NOTE:
1) RESISTORS:
WATTAGE — ½W EXCEPT AS NOTED.
TOLERANCE — 10% " " " .
2) CAPACITORS:
CAPACITY — IN μf " " " .
3) INDICATOR UNIT No. 1 DISPLAYS THE LEAST SIGNIFICANT DIGIT, No. 2 THE NEXT, ETC.,
4) LINES A-B-C-D CORRESPOND TO BINARY CODE POSITIONS 1-2-2-4 (OR 1-2-4-8) RESPECTIVELY.

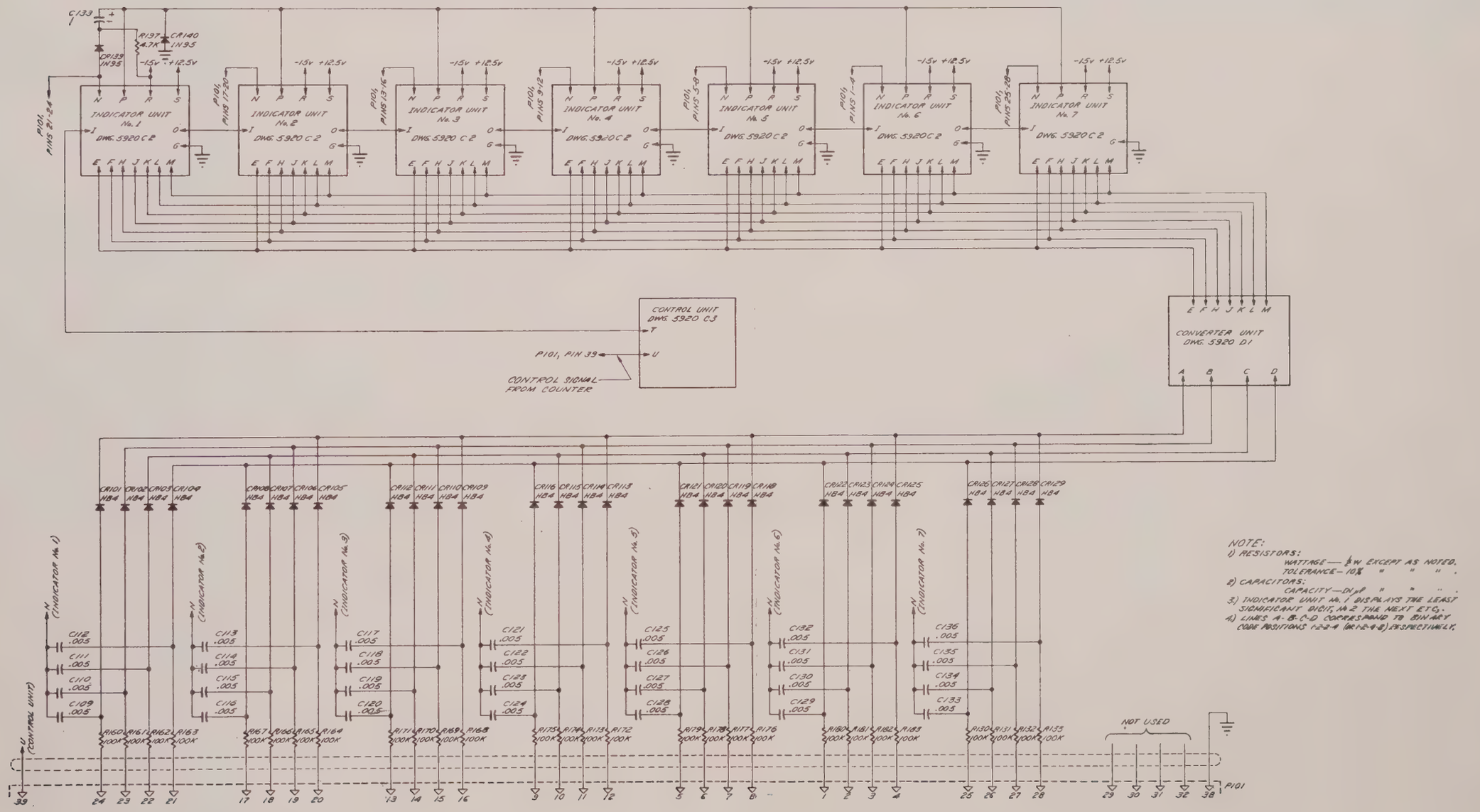
MODEL 5926, MASTER SCHEMATIC DIAGRAM


INDICATOR UNIT No. 1
INDICATOR UNIT No. 2
INDICATOR UNIT No. 3
INDICATOR UNIT No. 4
INDICATOR UNIT No. 5
INDICATOR UNIT No. 6
DWG. 5920 C 2
CONTROL UNIT DWG. 5920 C3
CONVERTER UNIT DWG. 5920 D1
P101, PIN 39
CONTROL SIGNAL FROM COUNTER
-15v +12.5v
NOT USED
READOUT
P101
7360
NOTE:
1) RESISTORS:
WATTAGE — ½W EXCEPT AS NOTED.
TOLERANCE — 10% " " " .
2) CAPACITORS:
CAPACITY — DI " " " " .
3) INDICATOR UNIT No. 1 DISPLAYS THE LEAST SIGNIFICANT DIGIT, No. 2 THE NEXT, ETC.,
4) LINES A-B-C-D CORRESPOND TO BINARY CODE POSITIONS 1-2-4-8 (OR 1-2-4-8) RESPECTIVELY.

BECKMAN/ BERKELEY DIVISION
DWG. NO. 5926 D 1

May 1960

MODEL 5927, MASTER SCHEMATIC DIAGRAM

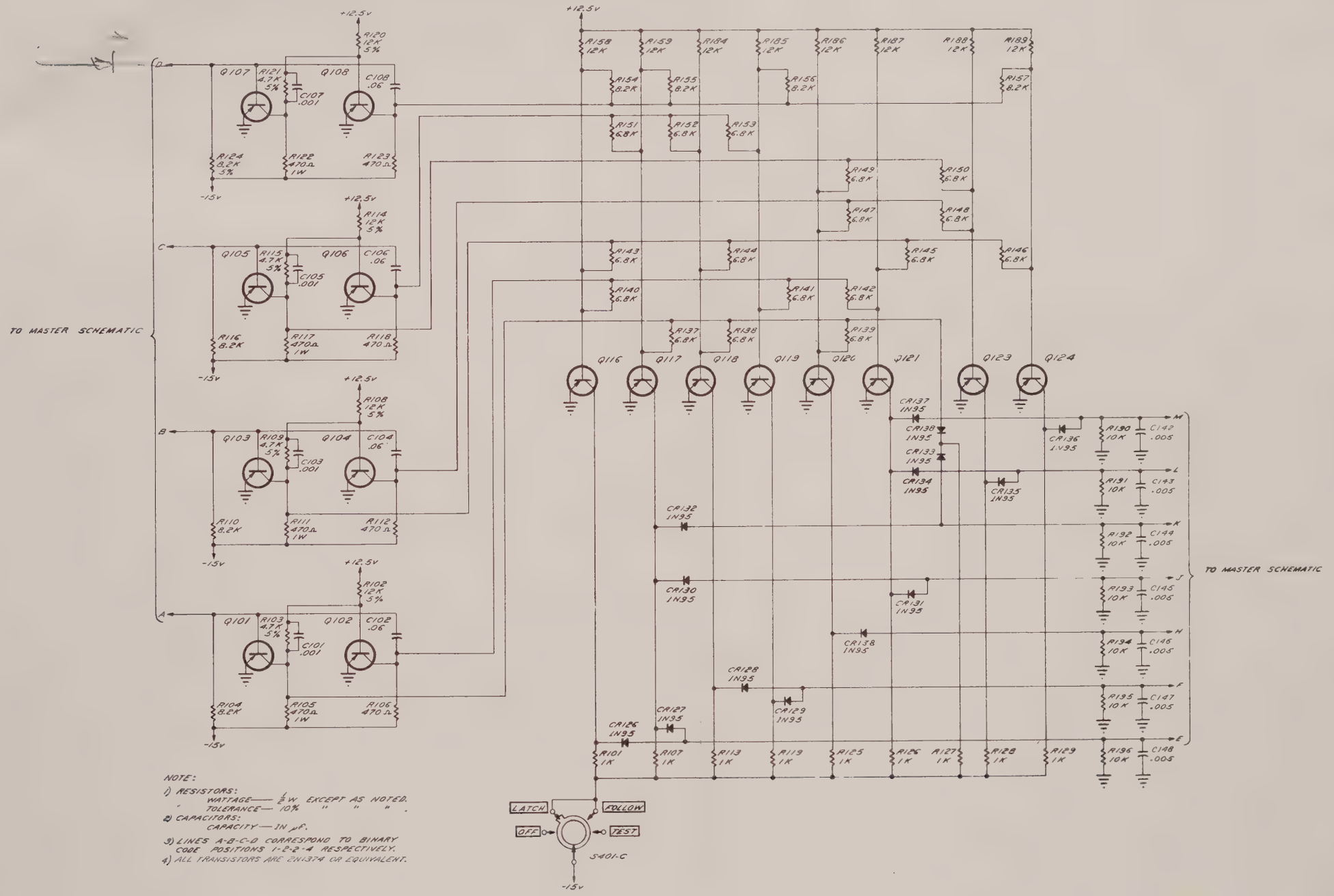


NOTE:
1) RESISTORS:
WATTAGE — ½W EXCEPT AS NOTED.
TOLERANCE — 10% " " " .
2) CAPACITORS:
CAPACITY — IN μF " " " .
3) INDICATOR UNIT No. 1 DISPLAYS THE LEAST SIGNIFICANT DIGIT, No 2 THE NEXT ETC.
4) LINES A-B-C-D CORRESPOND TO BIN ARY CODE POSITIONS 1-2-3-4 (OR 1-2-4-8) RESPECTIVELY.

May 1960

BECKMAN/ BERKELEY DIVISION
DWG. NO. 5927 D 1

CONVERTER UNIT, 1-2-2-4
SCHEMATIC DIAGRAM

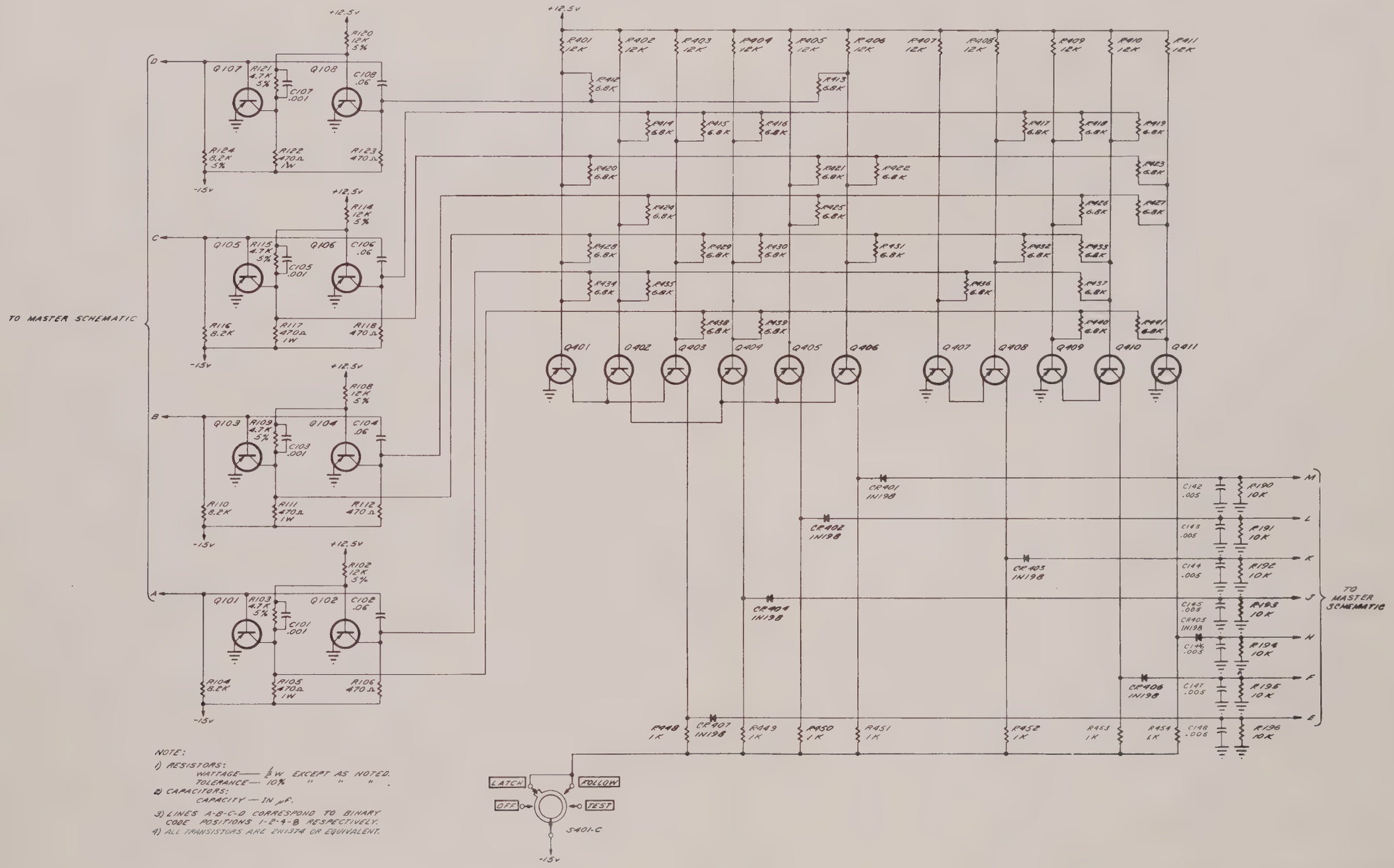


NOTE:

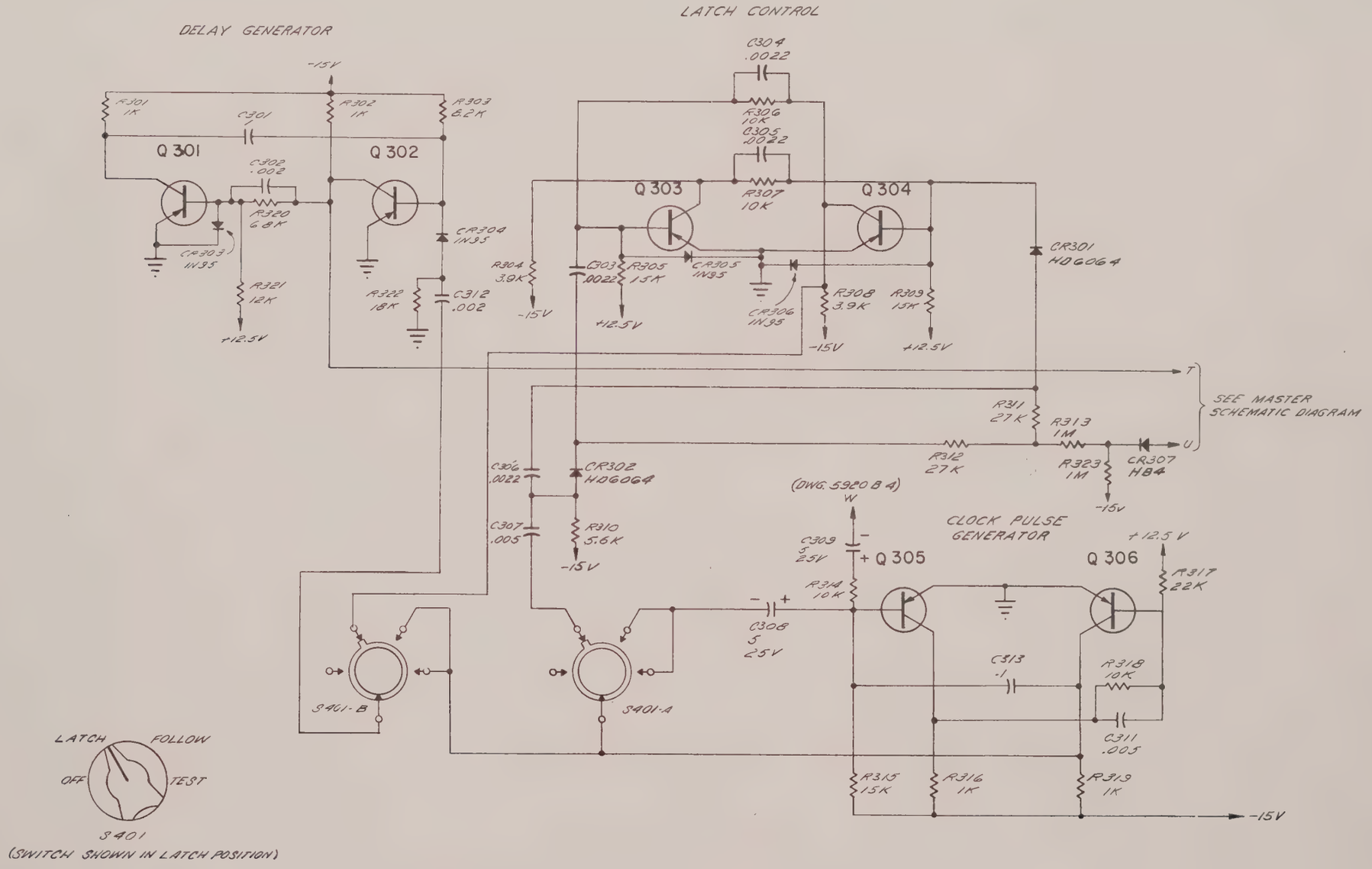
1) RESISTORS:
   WATTAGE — ½ W EXCEPT AS NOTED.
   TOLERANCE — 10% " " " .
2) CAPACITORS:
   CAPACITY — IN μF.
3) LINES A-B-C-D CORRESPOND TO BINARY CODE POSITIONS 1-2-2-4 RESPECTIVELY.
4) ALL TRANSISTORS ARE 2N1374 OR EQUIVALENT.

BECKMAN/ BERKELEY DIVISION
DWG. NO. 5920 D 1

CONVERTER UNIT, 1-2-4-8
SCHEMATIC DIAGRAM



CONTROL UNIT
SCHEMATIC DIAGRAM



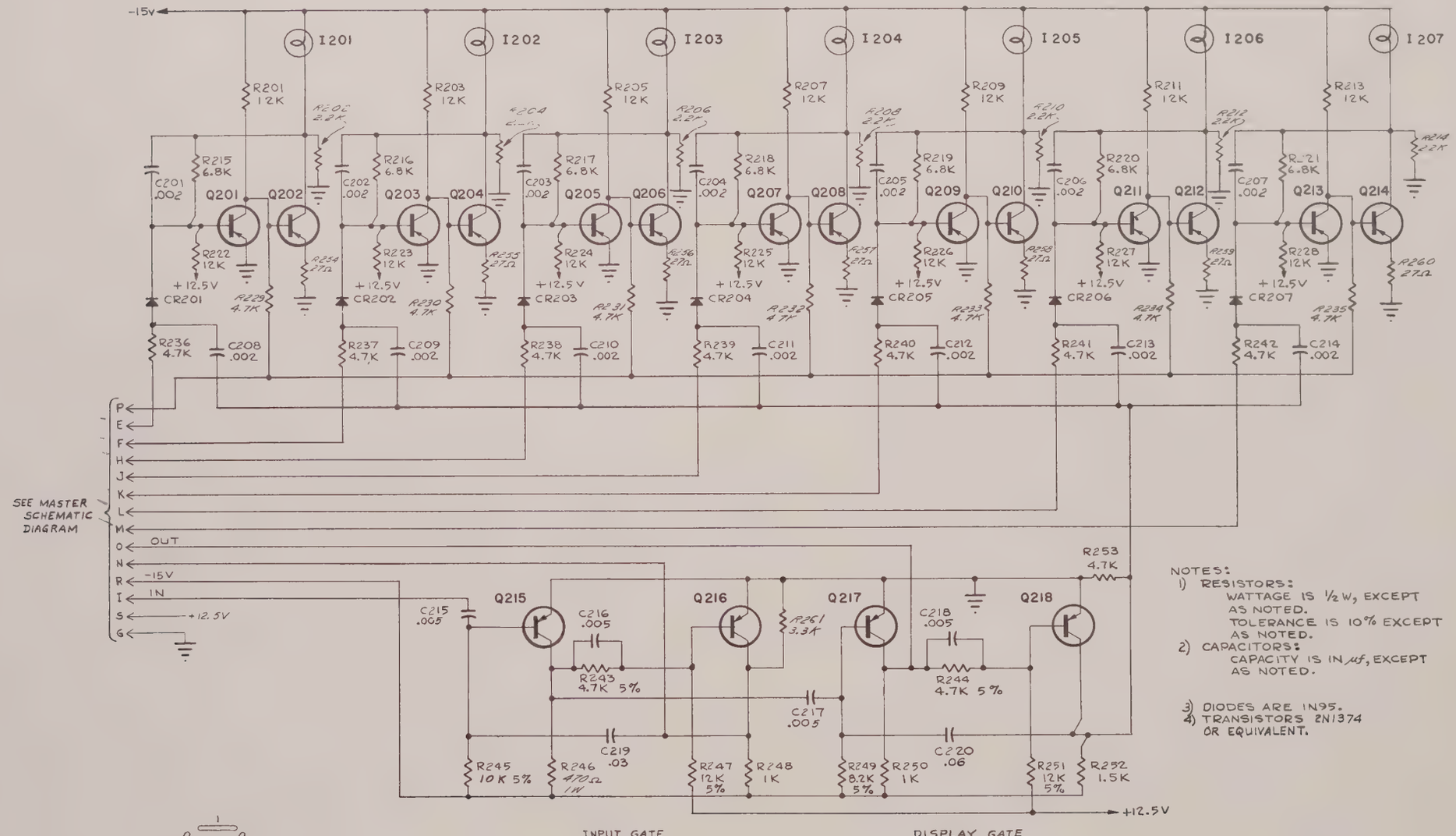
NOTE:
1) RESISTORS:
WATTAGE —— 1/2W UNLESS OTHERWISE NOTED.
TOLERANCE —— 10 % " " "
2) CAPACITORS:
CAPACITY —— IN μf UNLESS OTHERWISE NOTED.

3) ALL TRANSISTORS ARE 2N1374 OR EQUIVALENT.

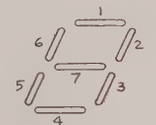
May 1960

BECKMAN/ BERKELEY DIVISION
DWG. NO. 5920 C 3

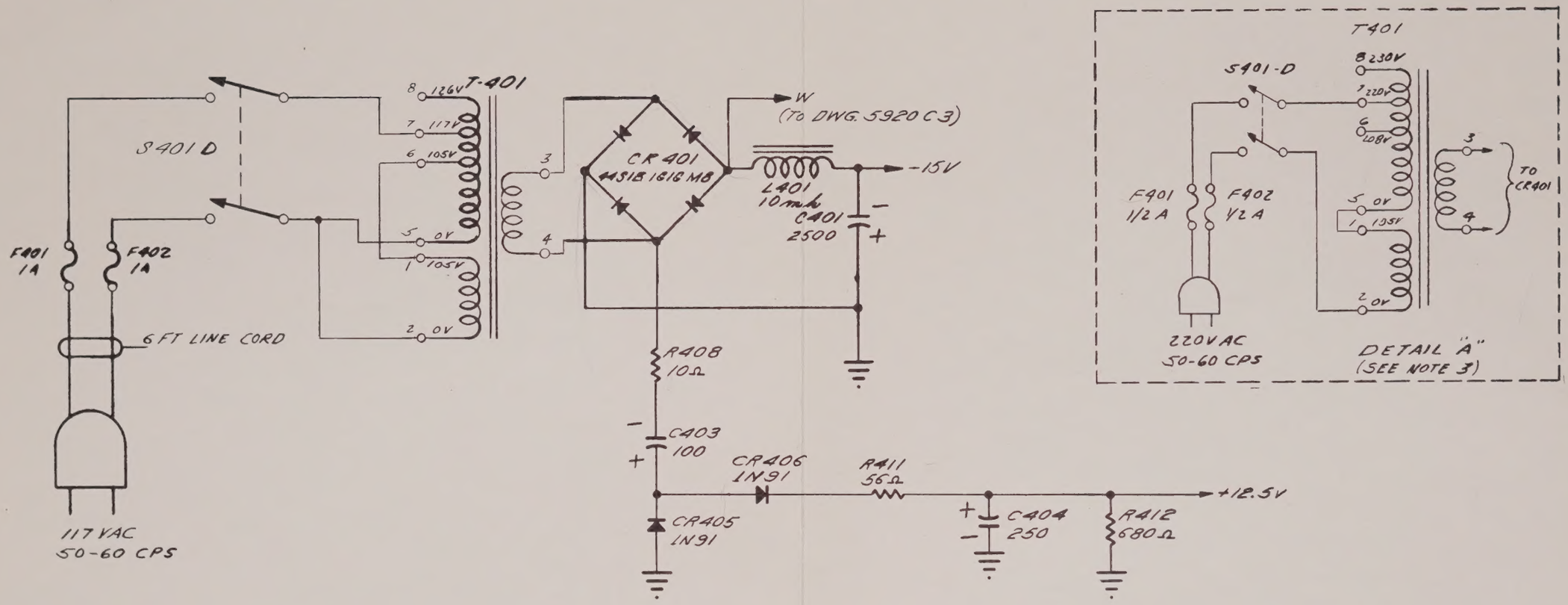
INDICATOR UNIT
SCHEMATIC DIAGRAM



NOTES:
1) RESISTORS:
WATTAGE IS ½ W, EXCEPT AS NOTED.
TOLERANCE IS 10% EXCEPT AS NOTED.
2) CAPACITORS:
CAPACITY IS IN μf, EXCEPT AS NOTED.
3) DIODES ARE IN95.
4) TRANSISTORS 2N1374 OR EQUIVALENT.



SEGMENTED INDICATING LAMPS I 201 THRU I 207



NOTES:
1) RESISTORS:
WATTAGE —— ½W UNLESS OTHERWISE NOTED.
TOLERANCE —— 10 % " " "
2) CAPACITORS:
CAPACITY —— IN μf UNLESS OTHERWISE NOTED.
3) FOR 220V AC OPERATION, REWIRE T401 & CHANGE FUSE AS SHOWN IN DETAIL "A"